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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/484,437	01/18/2000	Tongbi Jiang	M4065.0226/P226	9698

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EXAMINER

MITCHELL, JAMES M

ART UNIT	PAPER NUMBER
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2813

MAIL DATE	DELIVERY MODE
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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

09/484,437

Applicant(s)

JIANG, TONGBI

Examiner

JAMES M. MITCHELL

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 May 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,6-9,11,12,14,16-20,34,36,38-42,46 and 51 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,6-9,11,12,14,16-20,34,36,38-42,46 and 51 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

This office action is in response to the amendment filed May 2, 2008.

Claim Rejections - 35 USC § 112

Claims 1-3, 6-9, 11, 12, 14, 16-20 and 34, 36, 38-42, 46 and 51 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There is no support in applicant's original disclosure that "no part of the adhesive layer extends past an edge of the die."

Claim 3 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. These are not method claims, a product that requires a partially cured adhesive is excluded from being fully cured in a dependent claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which

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said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 6-9, 11, 12, 14, 16-20 and 34, 36, 38-42, 46 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amagai (U.S. 6,232,661) in combination with Forray (U.S. 2002/0062923).

Amagai (Fig. 3) discloses:

(cl.1) a prepackaged semiconductor device (examined to be prior to being encapsulated (Col. 5, Lines 52-55) assembly comprising: a solder mask (8) over a substrate (3), a die (2), conductive paths (5) connecting contacts on said die with contacts (4) in said substrate (via within perimeter portion of substrate) and an adhesive layer (e.g. above 8 not labeled) between said die and said solder mask, and being localized under the die (e.g. located below die);

(cl. 3) said prepackaged assembly encapsulated (9) over the assembly and said adhesive is fully cured (e.g. encapsulant after chip attachment; Col. 5, Lines 52-55);

(cl.38) subsequent processing is wirebonding (5) connecting contacts (e.g. point where wire connects to die, not labeled) and contact (e.g. 4) on substrate;

(cl. 41, 46) wherein said adhesive contacts mutually facing surfaces of said die and said solder mask (Fig. 3).

Amagai does not appear to disclose a partially-cured adhesive layer, the adhesive is a resin bismaleimide with a glassy temperature about 20-50 degrees with initiators, that said contacts are substantially free of contaminants outgassed from said solder mask, or that the partially cured adhesive has an adhesive strength sufficient to hold a die to a solder mask during subsequent package

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assembly processing that includes wirebonding, or that the adhesive is more impervious to affects of outgassing or is cross-linked.

However, Forray utilizes an adhesive with a glassy temperature between 20 to 50 degrees Celsius via a resin bismaleimide and further discloses a bismaleimide that is only **partially cured** adhesive (e.g. intermediate phase at point where material begins to cure then there's a portion that's not cured; Par. 0065, Table) with a semiconductor device that remains voidless after outgassing¹ (Abstract: "reduced void formation upon *curing*"; Paragraph 0048) therefore adhesive is more impervious to affects of outgassing (e.g. zero voids discloses in table; Par. 0065, paste F), and is at least partially cured (e.g. see Table 1, F; Par. 0007, Lines 6-8) and partially crosslinked (e.g. Par. 0065, Table Paste F; cure peak is 99.16) and therefore fully crosslinked, wherein the adhesive is inherently cured at a temperature between 20 to 50 degrees higher than glassy temperature (Tg) of said adhesive layer (admittedly by applicant, Page 6, bismaleimide Tg is 5-10 degree Celsius); and said adhesive contains an initiators (Par. 0028, Lines 9-10) which reacts at a temperature about 100 degree Celsius, and has an adhesive strength sufficient to hold a die to a solder mask (i.e. no additional adhesive is used) during subsequent package assembly processing (Par. 0065, Table; e.g. the heating process between the onset cure temperature

¹ Defines a natural phenomenon with outgassing (e.g. voids that trap moisture), but do not impart patentability, since patentability of a product is imparted by its structure. In this instance, since the claim an its independent claims broadly encompass an adhesive with no voids, further providing disadvantageous of outgassing does not add structural limitations, and therefore does not impart patentability.

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and cure peak is a subsequent package assembly process) that includes wirebonding (Par. 0065).

It would have been obvious to one of ordinary skill in the art to form the adhesive of Amagai utilizing the attaching steps, adhesive of Forray and its characteristics, in order to bond the chip and to eliminate void formation in the adhesive during a cure process as taught by Forray (Abstract; Par. 0047-0049) thereby providing contacts free from contaminants (via limited outgassing because no voids formed in adhesive).

With respect to the to the negative limitation of claim 1 that part of the adhesive extend past an edge of a die, applicant has not disclose that its dimensions is for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. As such, the selected dimensions of the adhesive being the sizes of the chip would have obvious to one of ordinary skill in the art, since it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

With respect to the process limitation of claims 1-3, 6-9, 11-20 and 33-37, and 40 as exemplified by “molded” or “subsequent processing” are product by process claims. “[E]ven though product-by-process claims are limited by and

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defined by the process, determination of patentability is based on the product itself, the prior art structure is the same as the claimed invention. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985)

Furthermore, with respect to claims 1 and 12, the intended use limitation of “adhesive strength sufficient to hold said die to solder mask during subsequent package assembly processing [wirebonding],” does not result in a structural difference between the claimed apparatus and the apparatus of the prior art. Further, because the apparatus of the prior art, Forray, is inherently capable of being used for the intended use the statement of intended use does not patentably distinguish the claimed apparatus from the apparatus of prior art. Similarly, the manner in which an apparatus operates is not germane to the issue of patentability of the apparatus; Ex parte Wikdahl 10 USPQ 2d 1546, 1548 (BPAI 1989); Ex parte McCullough 7 USPQ 2d 1889, 1891 (BPAI 1988); In re Finsterwalder 168 USPQ 530 (CCPA 1971); In re Casey 152 USPQ 235, 238 (CCPA 1967). Also, “Expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim.”; Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969). And, claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. In re Danley, 120 USPQ 528, 531 (CCPA

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1959). "Apparatus claims cover what a device is, not what a device does."

Hewlett-Packard Co. v. Bausch & Lomb Inc., 15 USPQ2d 1525, 1528 (Fed. Cir. 1990).

Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Onishi (JP 05-166961) in combination with Imayoshi et al. (U.S. 4,803,543).

Onishi (Fig.1) discloses:

(cl.1) a prepackaged semiconductor device (examined to be prior to being encapsulated assembly comprising: a solder mask (8) over a substrate (3), a die (2), conductive paths (70) connecting contacts on said die with contacts in said substrate (e.g. PCB) and a adhesive layer (9) between said die and said solder mask, and being localized under the die (e.g. located below die) such that no part of the adhesive extends past an edge of the die.

Onishi does not appear to disclose a partially-cured adhesive layer.

However Imayoshi discloses a partially cured adhesive (e.g. intermediate product during curing step; CLAIM 1).

It would have been obvious to one of ordinary skill in the art to utilize a partially cured adhesive in order to fix die/chip to its underlying surface as taught by Imayoshi (CLAIM 1 of Imayoshi).

Response to Arguments

Applicant's arguments filed May 2, 2007 with respect to the amended claims have been fully considered but are moot in view of the new ground(s) of rejection.

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Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art discloses the use of a chip attached by an adhesive to a solder mask formed on a substrate.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMES M. MITCHELL whose telephone number is (571)272-1931. The examiner can normally be reached on M-F 8:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on (571) 272-1702.

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The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Carl Whitehead Jr./
Supervisory Patent Examiner, Art Unit 2813

August 13, 2008
/James M. Mitchell/
Primary Examiner, Art Unit 2813